

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

LILLEY ET AL.

US 030503 US2

PCT No. PCT/IB04/52741

Confirmation No.

Serial No. 10/582,837

Group Art Unit:

Int. Filing Date: 9 December, 2004

Examiner:

Priority Date: 15 December, 2003

Title: SYSTEM FOR CHANGING THE AMPLITUDE OF MOVEMENT FOR A POWER
TOOTHBRUSH BRUSHHEAD BY CHANGING THE DRIVE FREQUENCY OF
THE TOOTHBRUSH

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Renewed Petition Under 37 CFR §1.137(b)

Sir:

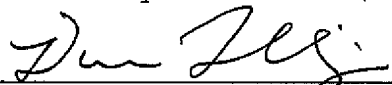
In response to the Decision on Petition of January 17, 2008,
this Renewed Petition under 37 CFR 1.137(b) is presented along with
a proper reply, namely, a Declaration of the inventors which does
not include two pages listed as 'page 2,' and includes a copy of
the Application attached to the Declaration at time of execution

thereof. The executed Declaration is included as Appendix AA of Exhibit A (which is a Declaration by GiGi Lamprecht as indicated below).

Further, as indicated on page 2 of the Decision on Petition of January 17, 2008, in order to perfect the statement of unintentional abandonment, a Declaration by GiGi Lamprecht is enclosed as Exhibit A related to the presentation of the Declaration to the inventors. Further enclosed as Exhibit B is a Declaration by Paul Im related to the preparation and response of the petition which was dismissed by the Decision on Petition of January 17, 2008.

It is believed that the enclosed Declarations by GiGi Lamprecht and Paul Im provide the necessary information for perfecting the statement of unintentional abandonment. Accordingly, reconsideration and grant of the Petition to Revive is respectfully requested.

Respectfully submitted,

By 
Dicran Halajian, Reg. 39,703
Attorney for Applicant(s)
March 11, 2008

Enclosure: Exhibit A, Declaration of GiGi Lamprecht (with Appendix AA, executed Declaration); and
Exhibit B, Declaration of Paul Im (with Appendix BA, Transmittal Letter to enter the National Stage in the U.S.)

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EXHIBIT A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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DECLARATION OF GIGI LAMPRECHT

I, GiGi Lamprecht, hereby declare that:

I am a Sr. Legal Assistant for Philips Electronics North
America Corporation, in the Intellectual Property Department. My

responsibilities include preparing and filing applications with the US Patent and Trademark Office.

I was assistant to Attorney Ernestine C. Bartlett, Reg. No. 22,861, who was responsible for the above-identified patent application at the time it was filed as a provisional application on December 15, 2003, and retired thereafter. Appendix AA shows Ms. Bartlett's signature on the Provisional Application Cover Sheet (Form PTO/SB/16). As assistant to Ms. Bartlett, I prepared formal papers including the Declaration for sending to the inventor(s) for review and execution.

For preparation of the filing of applications with the US Patent and Trademark Office, I prepare and send to the inventor(s), a Declaration form for execution, along with a copy of the application. My practice is to always send the inventor(s) the Declaration form for signature, along with the application, whenever the Declaration states that the application is attached, in which case the Declaration form does not go to the inventor(s) without a copy of the application.

Accordingly, the inventors who signed the Declaration form

indicating that the application is attached, should have had the application in front of them, which is the application that was filed with the U.S. Patent and Trademark Office as a Provisional Patent Application on December 15, 2003.

I searched our files and found a copy of the Declaration including the specification and drawings which was sent to and signed by the inventors, and is enclosed as Appendix AB.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

03/11/2008
Date

GiGi Lamprecht
GiGi Lamprecht

Appendix AA

13049 U.S. PTO
121503

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PTO/SB/18 (02-01)
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

Express Mail Label No. EV312068652 45 Date of Deposit: DECEMBER 15, 2003

INVENTOR(S)		Residence (City and either State or Foreign Country)
Given Name (first and middle (if any))	Family Name or Surname	
RONALD C.	LILLEY	35615 6 TH AVE. SW, FEDERAL WAY, WA, 98023, US
SCOTT E.	HALL	23505 SE 137 TH ST., LISSAQUAH, WA, 98027, US
JOHN W.	PAGE	4715 175 TH ST., BOTHELL, WA, 98012, US
WILLIAM E.	BRYANT	13530 432 ND AVE. SE, NORTH BEND, WA, 98045, US
JOSEPH W.	GREZ	10404 428 AVE. SE, NORTH BEND, WA, 98045, US
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto		
TITLE OF THE INVENTION (280 characters max)		
SYSTEM FOR CHANGING THE AMPLITUDE OF MOVEMENT FOR A POWER TOOTHBRUSH BRUSHHEAD BY CHANGING THE DRIVE FREQUENCY OF THE TOOTHBRUSH		
CORRESPONDENCE ADDRESS		
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Address _____		
City _____	State _____	ZIP _____
Country _____	Telephone _____	Fax _____
ENCLOSED APPLICATION PARTS (check all that apply)		
<input checked="" type="checkbox"/> Specification Number of Pages <u>8</u> <input type="checkbox"/> CD(s), Number _____		
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets <u>5</u> <input type="checkbox"/> Other (specify) _____		
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)		
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: <u>14-1270</u>		FILING FEE \$AMOUNT 160.00
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.		
<input checked="" type="checkbox"/> No.		
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____		

Respectfully submitted, *Ernestine C. Bartlett* Date 15 DECEMBER 2003
SIGNATURE _____ REGISTRATION NO.: 22,861
TYPED or PRINTED NAME ERNESTINE C. BARTLETT (if appropriate)
TELEPHONE (914) 333-9640 Docket Number: US030503

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C., 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Alexandria, VA 22313-1450.

15535 U.S. PTO
60/529597
121503

Appendix AB

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

**DECLARATION FOR UTILITY OR
DESIGN
PATENT APPLICATION
(37 CFR 1.63)**

☒ Declaration Submitted With Initial Filing OR ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number **US030503**
First Named Inventor **RONALD C. LILLEY**

COMPLETE IF KNOWN

Application Number **/**
Filing Date **CONCURRENTLY**
Group Art Unit
Examiner Name

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**SYSTEM FOR CHANGING THE AMPLITUDE OF MOVEMENT FOR A POWER
TOOTHBRUSH BRUSHHEAD BY CHANGING THE DRIVE FREQUENCY OF THE
TOOTHBRUSH**

the specification of which (Title of the invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY) Country	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1]

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Alexandria, VA 22313-1450.

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NAME OF SOLE OR FIRST INVENTOR:			<input type="checkbox"/> A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))			Family Name or Surname		
Ronald C.			LILLEY		
Inventor's Signature			X Date		
<i>Ronald C. Lilley</i>			3/16/2004		
Federal Way Residence: City		Washington State	United States Country	United States Citizenship	
35815 6 th Ave. SW Mailing Address					
Federal Way City		WA State	98023 Zip	US Country	
NAME OF SECOND INVENTOR:			<input type="checkbox"/> A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))			Family Name or Surname		
Scott E.			HALL		
Inventor's Signature			X Date		
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23505 SE 137th St. Mailing Address					
Issaquah City		WA State	98027 Zip	US Country	
<input checked="" type="checkbox"/> Additional Inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.					

DECLARATION — Utility or Design Patent Application

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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor		
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John W.		PACE		
Inventor's Signature		Date		
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City		State	Zip	Country
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor		
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William E.		BRYANT		
Inventor's Signature		Date		
<i>William E. Bryant</i>		05/05/04		
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13530 432 nd Ave. SE				
Mailing Address				
North Bend		WA	98045	US
City		State	Zip	Country
<input checked="" type="checkbox"/> Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.				

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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle (if any))		Joseph W.		Family Name or Surname	
Inventor's Signature		<i>Joseph W. Grez</i>		Date 3/5/01	
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10404 428 Ave. SE Mailing Address				United States Citizenship	
North Bend City		WA State		98045 Zip	
				US Country	
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle (if any))		Family Name or Surname			
Inventor's Signature		Date			
Residence: City		State		Country	
				Citizenship	
Mailing Address					
City		State		Zip	
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**SYSTEM FOR CHANGING THE AMPLITUDE OF MOVEMENT FOR A POWER
TOOTHBRUSH BRUSHHEAD BY CHANGING THE DRIVE FREQUENCY OF
THE TOOTHBRUSH**

Technical Field

5 This invention relates generally to power toothbrushes, and more specifically concerns such a toothbrush which is driven in a manner to produce a periodic change or variation in amplitude of a brushhead portion (which includes the bristles and bristle plate) of the toothbrush during operation thereof.

Background of the Invention

10 In power toothbrushes, there is usually a correlation between the amplitude of brushhead movement as it oscillates, relative to both cleaning effectiveness and sensory experience. Greater amplitude provides better cleaning results. However, there is a practical upper limit to the amplitude, above which discomfort occurs to the average user, although there is uncertainty as to the particular characteristics of the amplitude which are
15 responsible for the discomfort. In the present invention, the amplitude is varied in a particular manner, allowing a user to tolerate more amplitude, which increases the sensory brushing experience and improves the cleansing effect of the toothbrush as well.

Summary of the Invention

 Accordingly, the present invention is a system for resonantly driving a power
20 toothbrush having a resonant frequency, wherein a brushhead portion of the toothbrush moves in operation through a path with an amplitude about a center point, comprising: a resonant drive system for driving a brushhead at a drive frequency, the drive system including a circuit for changing the drive frequency relative to the center frequency to produce a periodic change of amplitude of the brushhead portion within the range of 5-
25 30%, providing an improved sensory experience without discomfort to the user.

Brief Description of the Drawings

 Figure 1 is a diagram of brushhead voltage (energy) against frequency for a power toothbrush having a known resonant frequency at approximately 259 Hz.

 Figure 2 is a block diagram of one embodiment of the toothbrush drive system of
30 the present invention.

 Figure 3 is a diagram of brushhead voltage (energy) against frequency using the system of Figure 2.

Figures 4 and 5 show diagrams of change (variation) of amplitude and peak amplitude against brushhead resonant frequency for a power toothbrush driven at 259 Hz.

Figures 6 and 7 show diagrams of change (variation) in amplitude against brushhead resonant frequency for a frequency modulated drive signal with different modulation rate (Figure 6) and different maximum frequency deviations of the modulation (Figure 7).

Figure 8 is a block diagram of another embodiment of the present invention.

Figures 9 and 10 are diagrams of variations in amplitude of the brush portion of the toothbrush against time and variation in drive frequency against time, respectively.

10 Best Mode for Carrying Out the Invention

Typically, power toothbrushes having a brushhead portion designed to oscillate about a center position are driven at a preselected frequency, referred to herein as a center frequency F_C . The center frequency is determined by the designer of the drive system and may be selected to be at or near the resonant frequency of the toothbrush to provide maximum efficiency relative to power consumed by the toothbrush during operation.

An example of such a toothbrush, using an electromagnetic drive system, is shown in U.S. Patent No. 5,189,751, which is owned by the assignee of present invention, the contents of which are hereby incorporated by reference. However, it should be understood that the present invention is not limited to a particular drive system, such as that shown in the '751 patent. Many other drive systems which produce an oscillating brushhead action are well known and can be used with the present invention.

Typically, a resonant drive toothbrush will operate slightly off resonance, since at resonance the amplitude of brushhead movement is quite high, resulting in significant discomfort to the average user. When the toothbrush is operated slightly off resonance, by 3 or 4 Hz, for instance, either above or below the resonant frequency, efficient cleaning results are obtained without discomfort to the user. Figure 1 shows a plot of brushhead voltage (energy) against frequency for a resonant drive toothbrush. Note that the plot line 12 has one large peak at region 14, in the vicinity of the resonant frequency of the toothbrush.

As indicated above, it is known that amplitude of the toothbrush brushhead movement during its oscillation is a major factor in cleaning of the teeth, as well as providing the desired sensory effect of cleaning produced by action of the toothbrush. The

sensory effect is quite important, as it provides the user an experience which indicates that an effective cleaning of the teeth and treatment of the gums has in fact occurred.

Increasing amplitude thus would appear to be desirable, to increase cleaning and sensory effect, but as indicated above, increasing amplitude beyond a particular point will result in significant discomfort to the average user.

In the present invention, the drive frequency is changed periodically, about F_C , such as by frequency modulation, to produce a periodic change (Δ) in motion (amplitude) of the brushhead, producing in effect an amplitude (motion) modulation, which results in an increase in average amplitude of brush movement. This produces an improved sensory brushing experience for the user, as well as a possible improvement in cleaning effect, without discomfort to the user.

In the present invention, with a resonant drive toothbrush, the center frequency F_C is first moved closer to the resonant frequency of the toothbrush, typically closer than would be done otherwise (because of resulting discomfort). The closeness of the center frequency to the resonant frequency has a significant effect on the resulting change of amplitude of brush movement due to frequency modulation. In the embodiment shown, for instance, for a toothbrush resonant frequency of 256.5, the center frequency is 259 Hz.

As the center frequency approaches the resonant frequency, the peak amplitude approaches its highest point, while the change or variation in Δ amplitude approaches a minimum. This is shown graphically in Figures 4 and 5, with plots of peak amplitude and change in amplitude against resonant frequency for a toothbrush driven at a frequency of 259 Hz with frequency modulation. Factors in the drive signal which affect the amplitude change of the brushhead include the frequency deviation (D) about F_C , i.e. the plus and minus variation of the drive frequency relative to the center frequency, the modulation frequency (F_M), the wave shape (all illustrated in Figure 10 (which is a plot of frequency against time) and the duty factor.

The combination of the above frequency modulation factors (in particular the modulation frequency (F_m), the frequency deviation (D) and the wave shape must maintain the change of amplitude within a range of 5-30%. A change (variation) in amplitude is illustrated in Figure 9, which is a plot of brushhead amplitude variation against time for a frequency modulated drive signal about F_C . Below 5% there is effectively no change in the sensory brushing experience or cleaning, while above 30% there is significant discomfort

to the average user. Preferably, the change is not greater than 20%, and most preferably is 10%.

The wave shape refers to the manner in which the drive frequency is changed, *i.e.* changing the drive frequency in one step is a square wave modulation signal, while
5 changing the frequency in a series of smaller steps over time to reach the maximum deviation is a triangular wave modulation signal, such as shown in Figure 10.

As indicated above, the peak amplitude of brushhead motion is the greatest when F_C is at the resonant frequency, while change (variation) in amplitude is at a minimum when F_C is at the resonant frequency. Hence, as indicated above, to obtain a periodic
10 change of amplitude, which is the thrust of the present invention, the center frequency must be some amount away from the resonant frequency of the device, in the present embodiment, approximately 3 Hz.

While the factors discussed herein influencing change of amplitude for frequency modulation of the drive signal are based on a resonant drive system, it is quite possible that
15 another type of modulation of the drive signal, resulting in a periodic change of amplitude, will also enhance cleaning effects and/or the sensory/brushing experience of cleaning in non-resonant systems as well. However, the explanation herein is based on a resonant drive system.

The effects of different modulation frequencies (rates) and different frequency
20 deviations (D) are shown in the graphs of Figures 6 and 7. Both of these graphs plot change of amplitude (Δ amplitude) versus brushhead resonant frequency for a toothbrush with a center frequency F_C of 259 Hz. Figure 6 shows that an increase in modulation frequency results in a significant decrease in change of brush amplitude (Δ amplitude), while Figure 7 shows that an increase in frequency deviation results in an increase in
25 change of brush amplitude (Δ amplitude) for a selected frequency difference between resonant frequency and center frequency (see for instance a resonant frequency of 256.5 with the center frequency of 259 Hz).

More particularly, from Figure 6, for a given center frequency F_C , the modulation frequency has a strong inverse effect on amplitude modulation. For instance, in an
30 embodiment where the center frequency is 259 Hz, relative to a resonant frequency of 256.5 Hz, a 12 Hz modulation frequency produces a change of amplitude within a particular range, depending upon the other factors of frequency deviation, wave shape and

duty factor. Increasing the modulation frequency from 12 Hz to 24 Hz reduces the change (variation) in amplitude or ΔA substantially, and further increasing the modulation frequency to 40 Hz brings the amplitude variation close to zero.

More particularly, from Figure 7, deviation (D), the change in frequency relative to the center frequency F_C , has a direct effect on the amplitude modulation. For instance, in the embodiment shown, the preferred deviation is ± 3.5 Hz. Doubling the deviation approximately doubles the change (variation) of amplitude.

Other factors influencing to some extent change of amplitude, as indicated above, include the wave shape of the modulation signal and the duty factor of the modulating frequency. The use of a triangle wave shape for the change in modulating frequency as opposed to a square wave shape, has approximately half the effect on change of amplitude (ΔA). With respect to the duty factor, the change in amplitude increases when the duty factor is reduced.

The preferred embodiment, for an amplitude change (ΔA) around 10%, has a resonant frequency of 262 Hz, a center frequency F_C of 259 Hz, a modulation frequency F_M of 12 Hz and a frequency deviation (D) of 3.5 Hz. The wave shape is triangular and the duty factor 48%. With such a system, an increase in sensory experience occurs, as well as improved cleaning, without discomfort. Figure 3 shows the distribution of energy relative to frequency for such an arrangement, specifically the drive signal's frequency spectrum.

Figure 2 is a block diagram showing the structural implementation of the system described above. A center frequency F_C is produced by a circuit, block 30. The center frequency is applied to a frequency source circuit 32, to which is also supplied the frequency modulation signal F_M by block 34. The frequency generated by the frequency source 32 is applied to the drive electronics of the toothbrush, as represented by block 36, which is in turn driven by a power source 38, such as a battery.

In one embodiment, the drive electronics 36 drives a magnetic drive coil 40, the action of which is coupled by a magnetic coupling arrangement 41 to a mechanical resonant system 42, which in turn drives the brush 44 in an oscillating manner.

In the arrangement above, the change of drive frequency about the center frequency F_C is accomplished by conventional frequency modulation means, which are well known, in which the drive frequency is changed at a selected rate. However, the change of frequency could be accomplished by another arrangement. This arrangement is shown in

Figure 8. Two simultaneously generated drive signals are combined together, with the resulting signal driving the brushhead. A first frequency signal is generated by frequency generator 60, while a second frequency signal is generated by frequency generator 62. Typically, one signal will be at the resonant frequency of the device, while the other signal
5 will be a frequency somewhat removed from the resonant frequency. In one case, for a resonant frequency of 262 Hz (the first frequency), the second frequency could be 242 Hz. Generally, the difference will be in the range of 5-30 Hz.

The two signals are then applied to an op-amp 64, where they are combined. The output of the op-amp 64 is a combined signal, the result of the two signals being "beat",
10 which produces a change in brushhead amplitude. The output is filtered to remove high frequencies. The remainder of the drive circuit shown in Figure 8 is similar to that of Figure 2.

Again, however, there are limitations relative to the range of change of amplitude over time, *i.e.* amplitude modulation, because of user discomfort. The selection of the
15 frequencies of the two signals is thus an important factor relative to achieving the desired results.

As mentioned above, the first embodiment, using frequency modulation, is described above in a resonant drive system, as is the other embodiment, with one of the two signals being at the resonant frequency.

Hence, a system has been disclosed for producing a change in amplitude, in effect
20 an amplitude modulation, of the brushhead movement by frequency modulating the drive signal. The amplitude modulation results in an improved sensory experience for the user and improved cleaning effect without discomfort.

Although a preferred embodiment of the invention has been disclosed for purposes of illustration, it should be understood that various changes, modifications and substitutions may be incorporated in the embodiment without departing from the spirit of the invention which is defined by the claims as follows:

CLAIMS:

1. A system for resonantly driving a power toothbrush having a resonant frequency, wherein a brushhead portion of the toothbrush moves in operation through a path with an amplitude about a center point, comprising:
a resonant drive system for driving a brushhead at a drive frequency, the drive system including a circuit for changing the drive frequency relative to the center frequency to produce a periodic change of amplitude of the brushhead portion within the range of 5-30%, providing an improved sensory experience without discomfort to the user.
2. The system of claim 1, wherein the change of amplitude is less than 20%.
3. The system of claim 1, wherein the center frequency is different from the resonant frequency of the toothbrush within a range of 0 to 5 Hz.
4. The system of claim 3, wherein the changing of the drive frequency is accomplished by frequency modulation.
5. The system of claim 4, wherein the difference between the center frequency and the resonant frequency is approximately ± 3 Hz.
6. A system of claim 1, wherein the driving frequency has a frequency deviation with a range of 1-14 Hz from the center frequency.
7. The system of claim 6, wherein the frequency deviation is approximately 3.5 Hz.
8. The system of claim 1, wherein the driving frequency change has a modulation frequency within the range of 3-40 Hz.
9. The system of claim 8, wherein the modulation frequency is approximately 12 Hz.
10. The system of claim 4, wherein the change of the drive frequency is in the form of a triangular wave.
11. The system of claim 1, wherein the change of drive frequency has a duty factor of approximately 48%.
12. The system of claim 1, wherein the drive system includes two driving signal sources, one signal source being at approximately the resonant frequency and the other signal source being at a frequency which is slightly different than the resonant frequency.
13. The system of claim 12, wherein the frequency of the second signal source is different than the frequency of the first source within a range of 5 to 30 Hz.

ABSTRACT

The drive system drives a brushhead at a driving frequency. The drive system includes a frequency modulation system which changes the driving frequency about a center frequency in such a manner, with selected frequency deviation and modulation
5 frequency, which interacts with the resonance of the brushhead to produce a change of amplitude in the movement of the brushhead within a range of 5-30%.

FIG 1

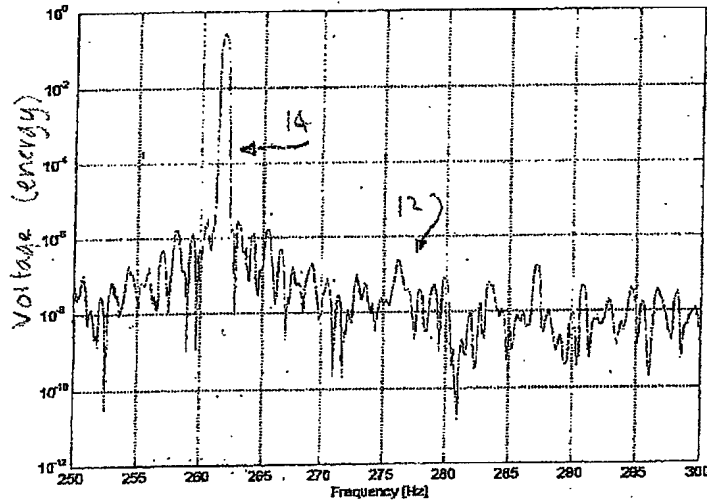


FIG 2

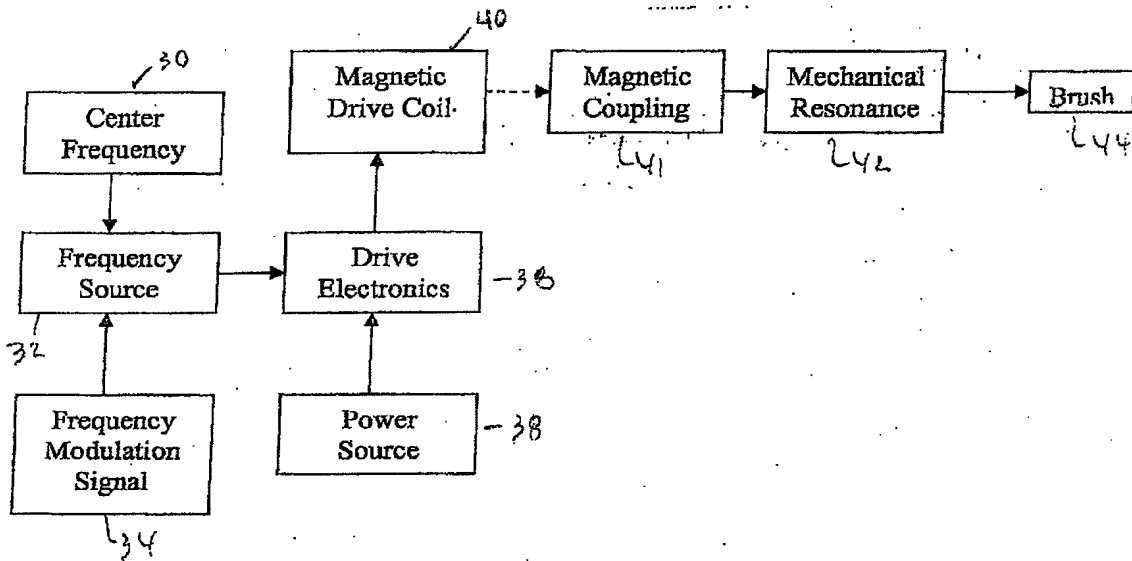


FIG 3

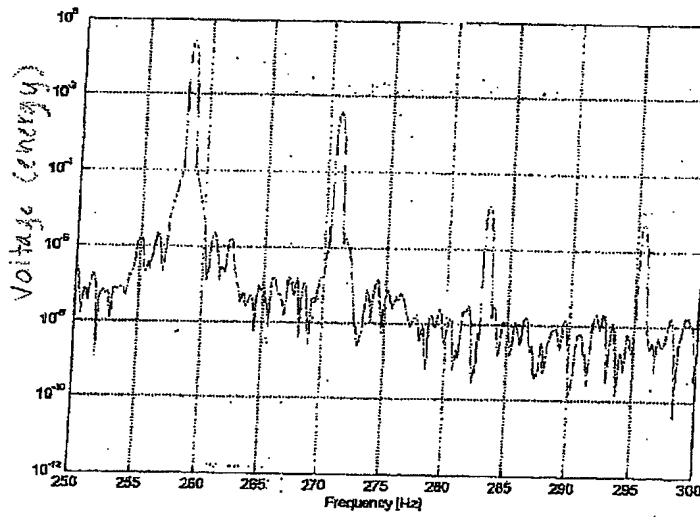


FIG 8

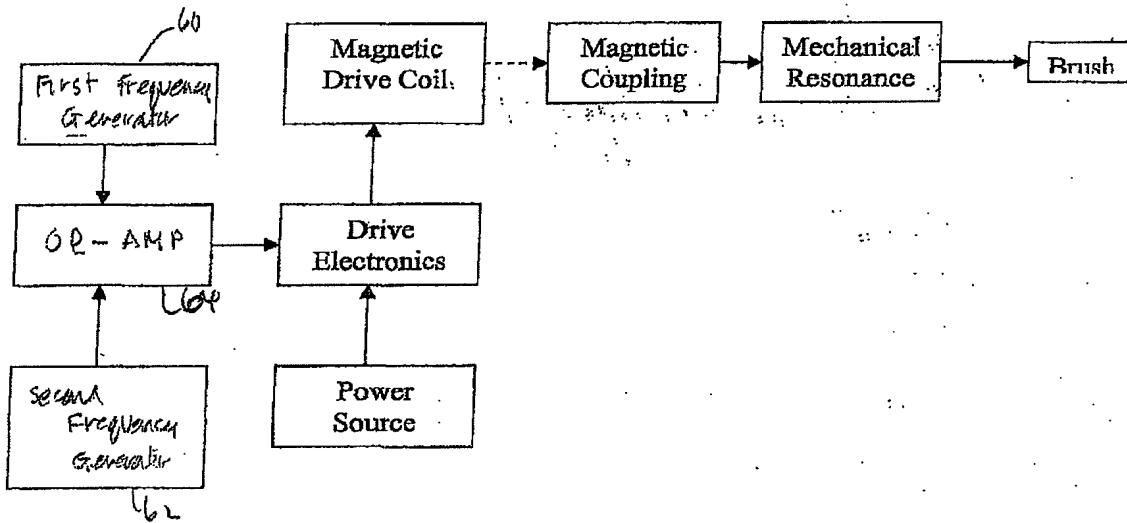


FIG 4

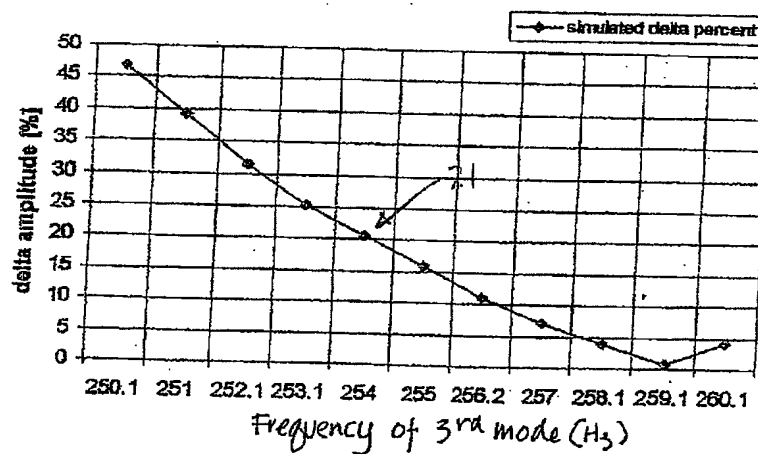
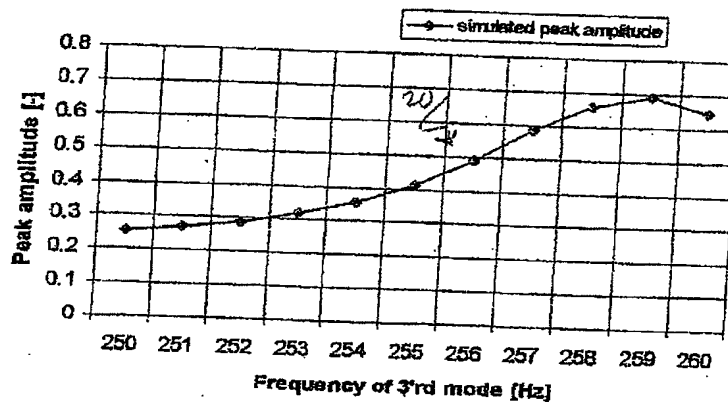
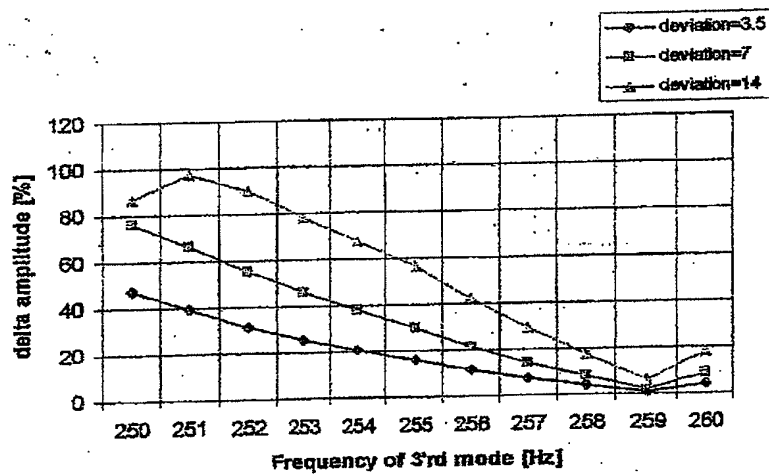
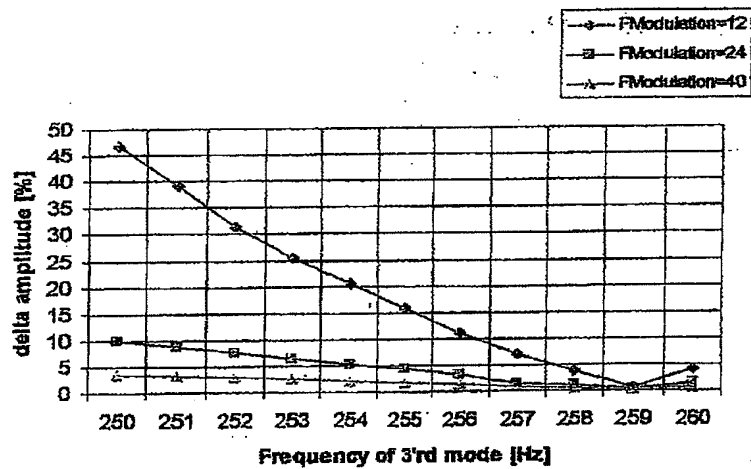


FIG 5





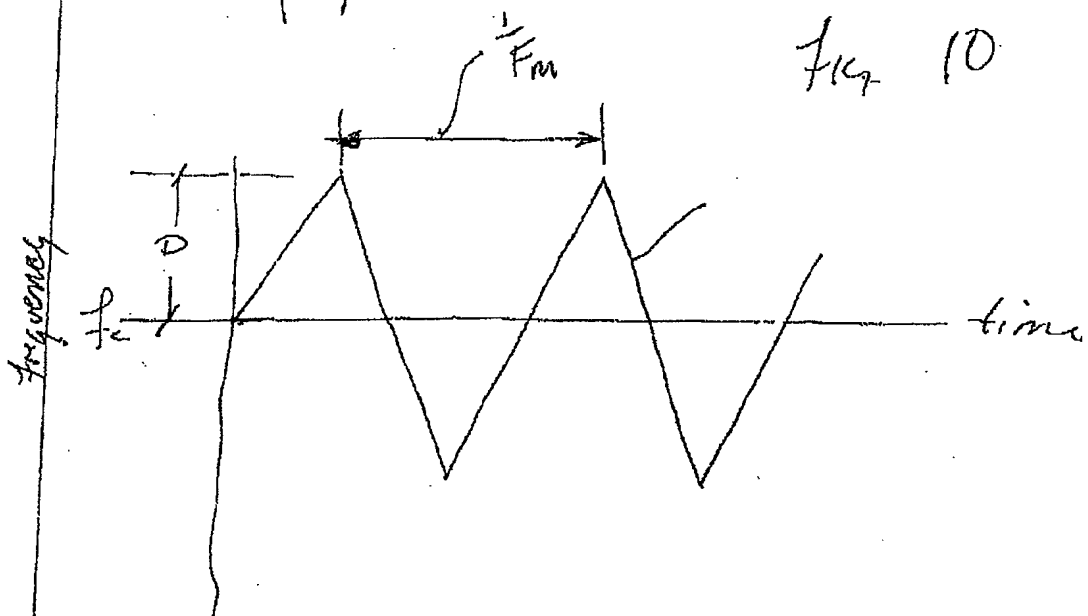
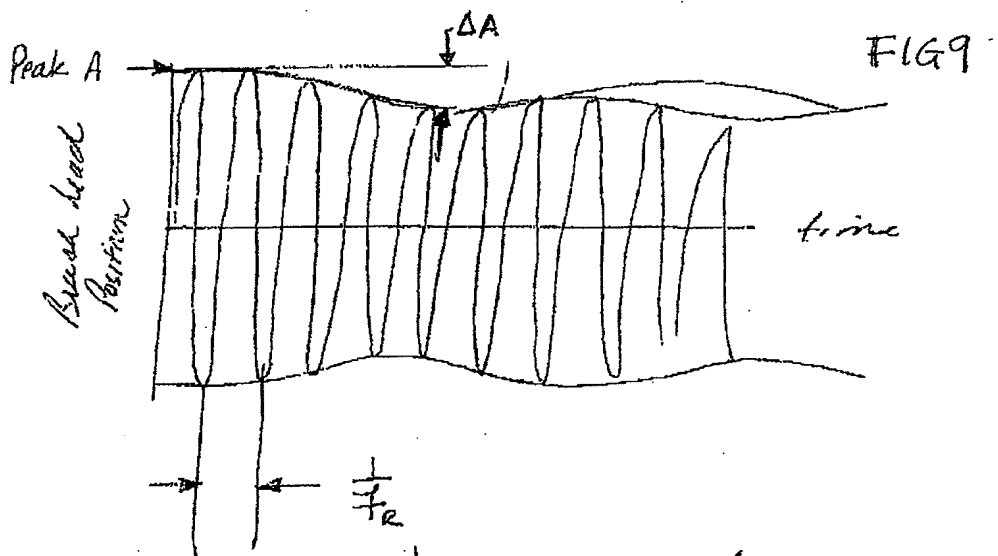


EXHIBIT B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

LILLEY ET AL.

US 030503 US2

Confirmation No.

PCT No. PCT/IB04/52741

Serial No. 10/582,837

Group Art Unit:

Int. Filing Date: 9 December, 2004

Examiner:

Priority Date: 15 December, 2003

Title: SYSTEM FOR CHANGING THE AMPLITUDE OF MOVEMENT FOR A POWER
TOOTHBRUSH BRUSHHEAD BY CHANGING THE DRIVE FREQUENCY OF
THE TOOTHBRUSH

Mail Stop Petitions
Commissioner for Patents
Office of PCT Legal Administration
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF PAUL IM

I, Paul Im, hereby declare that:

I am an Intellectual Property Counsel, Registration No.
50,418, for Philips Electronics North America Corporation. I have

a docket of cases and my responsibilities include preparing and reviewing patent applications that are on my docket, as well as prosecution thereof, with the US Patent and Trademark Office.

Prior to being responsible for the above-identified application, Adam L. Stroud (Reg. No. 48,410) was the attorney responsible for this application, and signed the Transmittal Letter to enter the National Stage in the U.S., which is enclosed as Appendix BA. After Adam L. Stroud resigned in late 2007, the above-identified application was transferred to my docket. Prior to Mr. Stroud being responsible for this application, Ernestine C. Bartlett (Reg. No. 22,861) was responsible for this application and filed it as a provisional application on December 15, 2003, and retired thereafter.

Upon transfer of the above-identified application to my docket and noting the status as abandoned, I reviewed the file of the above-identified application and prepared the Petition to Revive where I attached the Declaration of the inventors included in our file. Our file included two pages listed as 'page 2' of the Declaration.

As shown in the Declaration of the inventors, it appears that four of the five inventors signed the Declaration on March 5, 2004, where the third and fourth inventors signed page 3, and the fifth inventor signed page 4 of the same copy of the Declaration. On March 16, 2004, it appears that the first inventor signed page 2 of the same copy of the Declaration where the second inventor had signed on page 2 thereof. Upon execution of the Declaration by all five inventors, page 2 includes the signature of both the first and second inventors, signed on March 16 and March 5, 2004, respectively, thus appearing to indicate that the same copy of the Declaration was signed by all the inventors.

The executed Declaration of the inventors was retained in the file for filing with the US Patent and Trademark Office upon National Stage in the U.S. of the corresponding PCT Application, namely, PCT No. PCT/IB04/52741. It appears the executed Declaration was inadvertently not filed with the US Patent and Trademark Office upon entry of the National Stage in the U.S. and resulted in the abandonment.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

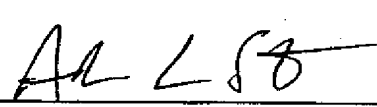

03/11/2008

Date

/Paul Im/

Paul Im, Reg. 50,418

Appendix BA

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				ATTORNEY'S DOCKET NO. US03 0503 US2 <div style="font-size: 1.5em; font-weight: bold; text-align: center;">10/582837</div>	
INTERNATIONAL APPLICATION NO. PCT/IB2004/052741		INTERNATIONAL FILING DATE 12/09/2004		PRIORITY DATE CLAIMED 12/15/2003	
TITLE OF INVENTION CHANGING AMPLITUDE OF MOVEMENT BY CHANGING THE DRIVE FREQUENCY OF A TOOTHBRUSH BRUSHHEAD					
APPLICANT(S) FOR DO/EO/US LILLEY, RONALD HALL, SCOTT E. PACE JOHN W. BRYANT, WILLIAM E. GREZ, JOSEPH W.					
Applicant(s) herewith submit to the United States Designated/Elected Office (DO/EO/US) the following:					
1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. 3. Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). <input checked="" type="checkbox"/> have not been made and will not be made. 4. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).					
The following document(s) or information are included:					
5. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98 6. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included 7. <input checked="" type="checkbox"/> A preliminary amendment 8. <input checked="" type="checkbox"/> Power of Attorney to Prosecute Application before the USPTO 9. <input type="checkbox"/> Statement under 37 CFR §3.73(b) 10. <input checked="" type="checkbox"/> Authorization Pursuant to 37 CFR § 1.136(a)(3) and to Charge Deposit Account <u>14-1270</u> 11. <input checked="" type="checkbox"/> Receipt Confirmation Postcard					
The following fees have been submitted:				CALCULATIONS PTO USE ONLY	
12. <input checked="" type="checkbox"/> Basic national fee \$ 300				\$ 900	
13. <input checked="" type="checkbox"/> Examination fee (Int'l prelim. exam. report NOT prepared by USPTO) \$ 200					
14. <input checked="" type="checkbox"/> Search Fee (Int'l Search Report prepared and provided to the Office.) \$ 400					
TOTAL OF 12, 13 and 14 =					
CLAIMS	# FILED	# EXTRA	RATE		
Total claims	13 - 20 =	0	X \$50	\$ 0	
Independent claims	1 - 3 =	0	X \$200	\$ 0	
TOTAL FEES FOR CLAIMS =				\$ 0	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h)) accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property +				\$ 40	
TOTAL FEES ENCLOSED =				\$ 940	
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge the above fees, as well as any additional fee which may be required, with the exception of the Base Issue Fee, or credit any overpayment to our Deposit Account No. 14-1270.					
SEND ALL CORRESPONDENCE TO: PHILIPS ELECTRONICS NORTH AMERICA CORPORATION Intellectual Property & Standards 1109 McKay Drive, M/S41-SJ San Jose, California 95131			USPTO CUSTOMER NO. <div style="font-size: 1.5em; font-weight: bold;">24738</div>		
			 Adam L. Stroud, Reg. No. 48,410 Tel.: (408) 474-9064		
CERTIFICATE OF EXPRESS MAILING I hereby certify that this paper and/or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 is addressed to "Mail Stop PCT, Commissioner for Patents, PO Box 1450, Arlington, VA 22313," on the date indicated below.					
(Date) - <u>6/14/06</u>		(Signature)  (Name) Vilimaina Naga			

The PTO did not receive the following listed item(s) No Assignment Document